# REVIEW OF MEDICAL AND VETERINARY MYCOLOGY

COMPILED FROM WORLD LITERATURE
ON MYCOSES OF MAN AND ANIMALS

Volume 7

COMMONWEALTH MYCOLOGICAL INSTITUTE
KEW · SURREY · ENGLAND
1970-72

o.—b

# COMMONWEALTH AGRICULTURAL BUREAUX

EXECUTIVE COUNCIL: R.E. CHANDISINGH (*Chairman*), Guyana; R.D. CROLL (*Vice-Chairman*), Australia; G. M. P. MYERS, M.SC., United Kingdom; J. W. GREENWOOD, Canada; V. ARMSTRONG, PH.D., New Zealand; T. N. TANDON, India; P. M. D. FERNANDO, Sri Lanka; Mrs. A.Y. AGGREY-ORLEANS, Ghana; M. SANI, Malaysia; U. K. BELLO, Nigeria; (To be nominated), Cyprus; His Excellency The High Commissioner for Sierra Leone; (To be nominated), Tanzania; The Deputy High Commissioner for Jamaica; Mrs. L. S. DORSET, Trinidad and Tobago; N. K. IRUMBA, Uganda; His Excellency, The High Commissioner for Kenya; M. V. PHIRI, Malawi; (To be nominated), Zambia; B. A. BALDEH, The Gambia; His Excellency The High Commissioner for Botswana; The Deputy High Commissioner for Barbados; B. APPADOO, Mauritius; R. M. MOTSA, Swaziland; K. R. BAIN, Fiji; D. M. KITCHING, Dependent Territories.

D.G. THOMAS, Secretary, Commonwealth Scientific Committee (Observer).

*Secretary:* E. A. RUNACRES

*Asst. Secretary:* N. G. JONES, D.F.C.

# COMMONWEALTH MYCOLOGICAL INSTITUTE

STAFF

*Director & Editor:* A. JOHNSTON, B.SC., A.I.C.T.A.

*Assistant Director:* C. BOOTH, PH.D.

*Scientific Information Officers:* P. BASU, B.SC.; N. CHURCHICH, B.A., M.PHIL., DIP.SCI.; F. DUROCHER YVON, M.B.E., DIP.AGRIC.; P. HOLLIDAY, M.A.; E.B. MARTYN, B.A., A.I.C.T.A.; Mrs. P. M. REID, M.SC.; Mrs. I. M. ROSS.

*Principal Mycologist:* M. B. ELLIS, PH.D.

*Mycologists:* Miss B. L. K. BRADY, PH.D.; F. C. DEIGHTON, O.B.E., M.A.; Miss J.A. HALL, B.A.; D.L. HAWKSWORTH, PH.D.; Miss J. E. M. MORDUE, PH.D.; J.L. MULDER, PH.D.; Mrs. A.H.S. ONIONS, PH.D.; E. PUNITHALINGAM, PH.D.; A. SIVANESAN, Ph.D.; Miss D.J. STAMPS, PH.D. (*Assistant Editor*); Miss P.M. STOCKDALE, PH.D. (*Assistant Editor*); B.C. SUTTON, PH.D.; Mrs. M. TULLOCH, B.SC.

*Bacteriologist:* J.F. BRADBURY, PH.D.

*ODA Scientific Liaison Officers:* I.A.S. GIBSON, PH.D.; J.M. WALLER, M.A.

The Editor gratefully acknowledges assistance with this volume from Mrs. M.R. COOPER, B.Sc., Dr. C. de VROEY, Mrs. V. DRING, B.Sc., Mrs. A.R. GRANT, M.A., Dr. R. HURLEY, Dr. P. KROGH and Dr. B.J. ZYSKA.

# LIAISON OFFICERS

*UNITED KINGDOM:* Under Secretary, Agricultural Research Council, 160 Great Portland Street, London, W1N 6DT.

*CANADA:* G.M. CARMAN, B.S.A., M.SC., PH.D., Director, Information Division, Department of Agriculture, 1105 Sir John Carling Building, Ottawa, Ontario.

*AUSTRALIA:* P.F. BUTLER, M.AGR.SC., C.S.I.R.O., Box 225, Dickson, A.C.T. 2602

*NEW ZEALAND:* I.L. BAUMGART, B.A., B.SC., Department of Scientific and Industrial Research, Private Bag, Wellington.

©*Commonwealth Agricultural Bureaux, 1978*

All rights reserved. No part of this publication may be reproduced in any form or by any means, electronically, mechanically, by photocopying, recording or otherwise, without the prior permission of the copyright owner.

*Printed in Great Britain by* UNWIN BROTHERS LIMITED

*INDIA:* M. S. SWAMINATHAN, B.SC., B.SC.AGR., PH.D.(Cantab), A.I.A.R.I., F.N.I., Director-General, I.C.A.R., Krishi Bhavan, New Delhi 1.

*SRI LANKA:* J.W.L. PEIRIS, B.SC., PH.D.(Lond.), D.I.C., DIP.AGR. (Lond.), Deputy Director of Agriculture (Research), Central Agricultural Research Institute, Gannoruwa Peradeniya.

*GHANA:* General Secretary, Council for Scientific and Industrial Research, P.O. Box M.32, Accra.

*MALAYSIA:* Permanent Secretary to the Ministry of Agriculture and Co-operatives, Swettenham Road, Kuala Lumpur, W. Malaysia.

*NIGERIA:* B.O.E. AMON, Secretary, Agricultural Research Council of Nigeria, Moor Plantation, Ibadan.

*CYPRUS:* R.C. MICHAELIDES, B.SC.AGR.(Edin.), N.D.A., DIP.AGR.EC. (Oxon), Director-General, Ministry of Agriculture and Natural Resources, Nicosia.

*SIERRA LEONE:* Research Coordinator, Njala University College, Njala.

*TANZANIA:* Director of Agriculture, P.O. Box 9071, Dar-es-Salaam.

*JAMAICA:* L.E. MCLAREN, B.SC., M.R.C.V.S., PH.D., M.I.BIOL., Technical Officer, Ministry of Agriculture and Fisheries, P.O. Box 480, Kingston 6.

*TRINIDAD AND TOBAGO:* Chief Technical Officer (Agriculture), Ministry of Agriculture, Lands and Fisheries, St. Clair Circle, Port of Spain, Trinidad.

*UGANDA:* Commissioner of Agriculture, Ministry of Agriculture, Forestry and Co-operatives, Department of Agriculture, P.O. Box 2, Entebbe.

*KENYA:* Under Secretary, Ministry of Agriculture, P.O. Box 30028, Nairobi.

*MALAWI:* P. BROWN, B.A.(Cantab), D.T.A., Chief Agricultural Research Officer, Ministry of Agriculture, P.O. Box 303, Zomba.

*ZAMBIA:* Permanent Secretary, Ministry of Rural Development, P.O. Box RW.197, Lusaka.

*THE GAMBIA:* L.J. MARENAH, B.SC.AGR.(Dunelm), PH.D.(N'cle), DIP.AGR.(Cantab), D.T.A., Director of Agriculture, Department of Agriculture, Cape St. Mary.

*GUYANA:* H.A.D. CHESNEY, Principal Agricultural Officer (Research), Ministry of Agriculture and Natural Resources, Central Agricultural Station, Mon Repos, East Coast Demerara.

*BOTSWANA:* Permanent Secretary, Ministry of Agriculture, Private Bag 3, Gabarone.

*BARBADOS:* Chief Agricultural Officer, Ministry of Agriculture and Fisheries, Crumpton Street, Bridgetown.

*MAURITIUS:* B.D. ROY, Chief Agricultural Officer, Agricultural Services, Reduit.

*SWAZILAND:* O.Z. DHLAMINI, Office of Permanent Secretary, Ministry of Agriculture, P.O. Box 162, Mbabane.

*FIJI:* Secretary for Agriculture, Fisheries and Forests, Suva.

*DEPENDENT TERRITORIES:* A.R. MELVILLE, C.M.G., B.SC., A.I.C.T.A., Agricultural Adviser, Overseas Development Administration, Eland House, Stag Place, London, SW1E 5DH.

*REPUBLIC OF IRELAND:* J. DOHERTY, B.L., Department of Agriculture and Fisheries (Development Division), Upper Merrion Street, Dublin 2.

# REVIEW OF MEDICAL AND VETERINARY MYCOLOGY

## READERS' GUIDE

The primary object of this *Review* is to provide a quarterly survey of the more important recent world literature on diseases of man and farm, domesticated, and wild animals (including fish and some large invertebrates but excluding insects) caused by fungi and actinomycetes; their aetiology, symptomatology, epidemiology and therapy. Allergic disorders of man and animals associated with fungi are also covered as are poisoning of man and animals by fungi or mould-contaminated feed.

Some 200 serial periodicals, including other abstracting journals, are examined regularly, but many others, together with miscellaneous publications and books, are also scanned. The material abstracted is carefully selected. An effort is made to abstract new data and to omit previously published information and well-known facts. Some background papers are noticed by brief 'directory notices'. Taxonomic papers are listed in the Institute's half-yearly *Bibliography of Systematic Mycology*, and new generic and specific names of fungi are compiled in the *Index of Fungi*.

To notice new work as soon as possible, early results are sometimes taken from the summaries in annual reports and other official publications; subsequent, more detailed publication of the same results in journals can then be treated more briefly. Back references to this *Review* (quoted [**6**, 123]=*Rev. med. vet. Mycol.*, vol. **6**, abstract no. 123) are given to link related publications and also to enable further details to be traced quickly.

When consulting an entry the reader should always remember that the title is an integral part of the abstract and may include data necessary for its full comprehension.

In a typical title the name(s) of the author(s) (initials only for men; one forename in full for women) are followed by the date of publication and then by the title of the publication or paper in bold face type in the original language, except for Japanese, Chinese, Arabic etc. Cyrillic characters are transliterated according to the British Standards System (see p. iv). An English translation follows in square brackets with (if necessary) the names of the pathogens adjusted to those used in the *Review*, which are kept in line with the International Codes of Botanical and Bacteriological Nomenclature and with current taxonomic opinion. It may be noted that, with at present the exception of dermatophytes, whenever the perfect state of a fungus is known and generally accepted, the name applied to this state is used, even if the paper abstracted refers only to the imperfect state (e.g. *Monosporium apiospermum* is referred to as the perfect state, *Allescheria boydii*). The fungus names recommended in the current Medical Research Council Memorandum No. 23, 'Nomenclature of Fungi Pathogenic to Man and Animals. Names recommended for use in the United Kingdom' are followed as closely as possible and the journal abbreviations are whenever possible those in the *World List of Scientific Periodicals*, 1963–65, and *BUCOP New Periodical Titles*, 1964—, those of Russian journals not included in the *World List* being given in transliteration within square brackets. The volume number, part number in round brackets, and first and last page numbers of the article complete the basic citation. Supplementary details given in square brackets include the numbers of plates, figures, diagrams, graphs, maps and tables; the number of bibliographical references is stated for papers providing a useful literature review; a note of summary or summaries in languages other than that of the original, with an indication when such summaries are very detailed: and when possible, if not self-evident, the abbreviated address of the first author. The date of receipt by the Institute is usually given only when there seems to be doubt regarding the year of publication.

The abstracts are arranged in an ever repeating series as indicated by page and section headings.

## ARRANGEMENT OF ABSTRACTS

REPORTS
BOOKS
GENERAL papers
TECHNIQUES
FUNGICIDES
ANTIBIOTICS
IMMUNOLOGY (general papers or papers covering more than one mycosis)
ACTINOMYCOSES
    Actinomycosis
    Nocardiosis
    *Dermatophilus* infections (Streptotrichosis, ' lumpy wool ', etc.)
DERMATOMYCOSES
    Dermatophytoses
    Tinea nigra
    Pityriasis versicolor
    Piedra
CHROMOMYCOSIS
    Cladosporiosis
MYCETOMA (including mycetoma caused by *Nocardia* and *Streptomyces* but not *Actinomyces*)
ASPERGILLOSIS
CANDIDIASIS
CRYPTOCOCCOSIS
MISCELLANEOUS YEASTS
GEOTRICHOSIS
ADIASPIROMYCOSIS
COCCIDIOIDOMYCOSIS
HISTOPLASMOSIS
    Epizootic lymphangitis
NORTH AMERICAN BLASTOMYCOSIS
SOUTH AMERICAN BLASTOMYCOSIS
    Cheloidal Blastomycosis
PHYCOMYCOSIS
RHINOSPORIDIOSIS
SPOROTRICHOSIS
MISCELLANEOUS MYCOSES (conditions which do not fit elsewhere, e.g. eye and ear infections, mycotic abortion, etc.)
ASTHMA & ALLERGY (including air spora)
POISONOUS FUNGI (including mycotoxicoses)

In general, infections of animals follow those of man.

(The entries in capitals are those used for page and section headings)

## ABBREVIATIONS

| | |
|---|---|
| Å | Ångström unit |
| Abs. | Abstract(ed) |
| abs. | absolute |
| Acad. | Academy |
| Admin. | Administration |
| Agric. (agric.) | Agriculture (Agricultural) |
| appl. | Applied |
| approx. | approximately |
| Ass. | Association |
| atm. | atmosphere(s) (of pressures, etc.) |
| av. | average |
| Bact.(bact.) | Bacteriology (Bacteriological) |
| Biol.(biol.) | Biology (Biological) |
| Bot.(bot.) | Botany (Botanical) |
| b.p. | boiling point |
| B.P. | British Pharmacopoeia |
| Brit. | British |
| °C | degrees Centigrade |
| *c.* | circa (approx.) |
| C. | Centre, Central |
| cf. | compare |
| chapt. | chapter(s) |
| Chem. (chem.) | Chemistry (Chemical) |
| cm | centimetre(s) |
| col. | coloured (as in col. pl.) |
| Coll. | College |
| Commw. | Commonwealth |
| conc. | concentrated (concentration) |
| const. | constant |
| D- | configuration of amino acids and carbohydrates |
| Dept | Department |
| Derm. (derm.) | Dermatology (Dermatological) |

| | |
|---|---|
| diag. | diagram(s) |
| diam. | diameter, in diameter |
| Div. | Division |
| DNA | desoxyribonucleic acid |
| E. | east |
| Ed. | Edition |
| e.g. | for example |
| Exp.(exp.) | Experiment (Experimental) |
| °F | degrees Fahrenheit |
| Fac. | Faculty |
| fam. | family |
| fig. | figure(s) |
| ft | foot (feet) |
| g | gram(s) |
| Gram + | Gram-positive |
| Gram − | Gram-negative |
| Gen. | General |
| gen. | genus |
| gen.nov. | new genus |
| gr | grain(s) |
| Gynaecol. (gynaecol.) | Gynaecology (Gynaecological) |
| Hosp. | Hospital |
| hr | hour(s) |
| Hyg. | Hygiene |
| ibid. | the same |
| i.e. | that is |
| Immunol. (immunol.) | Immunology (Immunological) |
| in | inch(es) |
| Inst. | Institute |
| Instn | Institution |
| I.U. | international units |
| kg | kilogram(s) |
| km | kilometre(s) |
| L- | configuration of amino acids and carbohydrates |
| l | litre(s) |
| Lab. | Laboratory |
| lb | pound(s) |
| loc. cit. | place (already) cited |
| log. | logarithm |
| M | molar or molal (g.mol.) |
| m | metre(s) |
| *m-* | *meta-* (of organic compounds) |
| max. | maximum |
| Med. (med.) | Medicine (Medical) |
| mg | milligram |
| Microbiol. (microbiol.) | Microbiology (Microbiological) |
| min | minute(s) |
| min. | minimum |
| Minist. | Ministry |
| ml | millilitre(s) |
| mm | millimetre(s) |
| mol. | molecule |
| Mus. | Museum |
| mμ | millimicron ($10^{-6}$mm) |
| Mycol. (mycol.) | Mycology (Mycological) |
| N. | north |
| N | normal (of solutions) |
| Natn. | National |
| no. | number(s) |
| nov. | new (e.g. sp.nov., gen.nov.) |
| *o-* | *ortho-* (of organic compounds) |
| Ophthal. (ophthal.) | Ophthalmology (Ophthalmological) |
| opt. | optimum |
| oz | ounce(s) |
| p., pp. | page, pages |
| *p-* | *para-* (of organic compounds) |
| Path.(path.) | Pathology (Pathological) |
| pH | hydrogen-ion concentration |
| Pharm. (pharm.) | Pharmacy (Pharmaceutical) |
| Pharmacol. (pharmacol.) | Pharmacology (Pharmacological) |
| Physiol. (physiol.) | Physiology (Physiological) |
| Phytopath. (phytopath.) | Phytopathology (Phytopathological) |
| pl. | plate(s) |
| ppm | parts per million |
| psi | (pounds) per square inch |
| q.v. | which see |
| r | röntgen unit |
| ref. | reference(s) |
| Res. | Research |
| R.H. | relative humidity |
| RNA | ribonucleic acid |
| rpm | revolutions per minute |
| S. | south |
| Sch. | School |
| Sci.(sci.) | Science(s) (Scientific) |
| S.D. | standard deviation |
| S.E. | standard error (or South East) |
| sec | second(s) |
| Sect. | Section |
| Serol. (serol.) | Serology (Serological) |
| Soc. | Society |
| sol. | solution |
| sp., spp. | species (singular and plural) |
| sp.gr. | specific gravity |
| sp.nov. | new species |
| Sta. | State |
| Stn | Station |
| str. | strain |
| summ. | summary (summaries) |
| Surg. (surg.) | Surgery (Surgical) |
| Syph. (syph.) | Syphilology (Syphilological) |
| tech. | Technical |
| Technol. | Technology |
| temp. | temperature |
| Trop.(trop.) | Tropic(s) (Tropical) |
| Univ. | University |
| UV | ultra-violet |
| v | volume (as in $^{w}/_{v}$), see vol. |
| var. | variety |
| Vet. | Veterinary |
| viz. | namely |
| vol. | volume(s), see v |
| W. | west |
| w | weight (as in $^{w}/_{v}$) |
| wt. | weight |
| yd | yard(s) |
| yr | year(s) |
| Zool.(zool.) | Zoology (Zoological) |
| μ | micron ($10^{-3}$ mm) |
| μg | microgram |
| : | ratio (e.g. 1:10); in references precedes page numbers |
| / | per (as in g/l); in (for dilutions, e.g. 1/10) |
| > | more than |
| < | less than |

English & Welsh Counties:

Beds., Bedfordshire; Berks., Berkshire; Bucks., Buckinghamshire; Cambs., Cambridgeshire; Carms., Carmarthenshire; Ches., Cheshire; Glam., Glamorgan; Glos., Gloucestershire; Hants., Hampshire; Herts., Hertfordshire; Hunts., Huntingdonshire; Lancs., Lancashire; Leics., Leicestershire; Lincs., Lincolnshire; Middx., Middlesex; Mon., Monmouthshire; Northants., Northamptonshire; Notts., Nottinghamshire; Oxon., Oxfordshire; Pembs., Pembrokeshire; Salop, Shropshire; Staffs., Staffordshire; Warwicks., Warwickshire; Wilts., Wiltshire; Worcs., Worcestershire; Yorks., Yorkshire.

U.S.A. States:

Ala, Alabama; Ariz., Arizona; Ark., Arkansas; Calif., California; Colo, Colorado; Conn., Connecticut; Del., Delaware; D.C., District of Columbia; Fla, Florida; Ga, Georgia; Ill., Illinois; Ind., Indiana; Kans, Kansas; Ky, Kentucky; La, Louisiana; Md, Maryland; Mass., Massachusetts; Mich., Michigan; Minn., Minnesota; Miss., Mississippi; Mo., Missouri; Mont., Montana; Neb., Nebraska; Nev., Nevada; N.Hamp., New Hampshire; N.J., New Jersey; N. Mex., New Mexico; N.Y., New York; N. Carol., North Carolina; N. Dak., North Dakota; Okla, Oklahoma; Ore., Oregon; Pa, Pennsylvania; R.I., Rhode Island; S.Carol., South Carolina; S. Dak., South Dakota; Tenn., Tennessee; Vt, Vermont; Va, Virginia; Wash., Washington; W.Va, West Virginia; Wis., Wisconsin; Wyo., Wyoming.

Canadian Provinces:

Alta, Alberta; B.C., British Columbia; Man., Manitoba; N.B., New Brunswick; N.S., Nova Scotia; Ont., Ontario; P.E.I., Prince Edward Island; Que., Quebec; Sask., Saskatchewan.

In addition, the international symbols for the commoner chemical elements and a number of simple chemical formulae are used.

## Transliteration of Cyrillic characters according to British Standard 2979:1958.*

*Russian*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| A, a | А, а | B, b | Б, б | Ch, ch | Ч, ч | D, d | Д, д |
| E, e | Е, е | Ë, ë | Ё, ё | É, é | Э, э | F, f | Ф, ф |
| G, g | Г, г | I, i | И, и | Ĭ, ĭ | Й, й | K, k | К, к |
| Kh, kh | Х, х | L, l | Л, л | M, m | М, м | N, n | Н, н |
| O, o | О, о | P, p | П, п | R, r | Р, р | S, s | С, с |
| Sh, sh | Ш, ш | Shch, shch | Щ, щ | T, t | Т, т | Ts, ts | Ц, ц |
| U, u | У, у | V, v | В, в | Y, ȳ | Ы, ы | Ya, ya | Я, я |
| Yu, yu | Ю, ю | Z, z | З, з | Zh, zh | Ж, ж | ' " | ь, ъ |

*Additional for Ukrainian*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| H, h | Г, г | I, i | І, і | Y, ȳ | И, и | Ye, ye | Є, є | Yi, yi | Ї, ї |

*Additional for Bulgarian*

| | | | |
|---|---|---|---|
| Sht, sht | Щ, щ | Ŭ, ŭ | Ъ, ъ |

* *British Standard for transliteration of Cyrillic and Greek characters*, 23 pp., London (British Standards Institution), 1958. 12s. 6d.

*Printed in Great Britain by The Eastern Press, Ltd., London and Reading*